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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/781,574	02/17/2004	Juha Hujanen	ASMMC.032DV1	3049

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EXAMINER

BERNATZ, KEVIN M

ART UNIT PAPER NUMBER

1773

DATE MAILED: 05/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/781,574

Applicant(s)

HUJANEN ET AL.

Examiner

Kevin M Bernatz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 6/1/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Response to Amendment

1. Preliminary amendments to claims 11 - 13, filed on February 14, 2005, have been entered in the above-identified application.

Election/Restrictions

2. The restriction requirement from the Office Action mailed January 18, 2005 has been rendered moot by the aforementioned amendment and is hereby withdrawn.

Examiner's Comments

3. Regarding the limitation(s) "barrier layer" in claims 7 and 8, the Examiner has given the term(s) the broadest reasonable interpretation(s) consistent with the written description in applicants' specification as it would be interpreted by one of ordinary skill in the art. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997); *In re Donaldson Co., Inc.*, 16 F.3d 1190, 1192-95, 29 USPQ2d 1845, 1848-50 (Fed. Cir. 1994). See MPEP 2111. Specifically, the Examiner notes that "barrier layer" simply refers to a layer formed of a non-magnetic material and for the purpose of evaluating the prior art the Examiner notes that any non-magnetic layer will meet the term "barrier layer".

Claim Objections

4. Claim 1 is objected to because of the following informalities: "ALD-formed" should be written out the first time it is used in the claims to avoid confusion. I.e. claim 1 should preferably read 'comprising an atomic layer deposited (ALD-formed) head gap fill layer ...'. Appropriate correction is required.

Specification

5. Applicants are asked to update the first paragraph of the application to reflect the current status of parent application 10/136,095.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1 and 5 - 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Albert et al. (U.S. Patent No. 4,219,853).

Regarding claims 1 and 5 - 7, Albert et al. disclose a magnetic read head (*Title*), comprising a head gap fill layer (*Figure 2, element 34R and col. 2, lines 44 - 48*)

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overlying a barrier layer (*col. 2, lines 25 – 39 – substrate*) and/or a magnetic shield layer comprising nickel-iron (*col. 2, lines 30 – 43*), wherein the head gap fill layer is selected from the group consisting of aluminum oxide, aluminum nitride, mixtures thereof and layered structures thereof (*col. 2, lines 44 – 48*).

Regarding the limitation(s) “ALD-formed”, the Examiner notes that this limitation(s) are/(is a) process limitation(s) and is/are not further limiting in terms of the structure resulting from the claimed process. Specifically, in a product claim, as long as the prior art product meets the claimed structural limitations, the method by which the product is formed is not germane to the determination of patentability of the product unless an *unobvious difference* can be shown to result from the claimed process limitations. In the instant case, the Examiner takes official notice that sputtering and atomic layer deposition (ALD) are both known methods for forming dielectric layers used as magnetic gaps in the field of magnetic read heads (*see supporting documents below*).

8. Claims 1, 2, 5 – 7 and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Okamoto (U.S. Patent No. 6,329,087 B1).

Regarding claims 1 and 11, Okamoto discloses a magnetic head read (*Title*) comprising a head gap fill layer meeting applicants’ claimed composition limitation (*col. 1, lines 52 – 58: wherein Al-N-O is deemed a mixture of aluminum oxide and aluminum nitride*). The limitation “ALD-formed” is deemed not germane to the determination of patentability of the claimed *product* for the reasons discussed above.

Regarding claim 2, Okamoto discloses thickness values meeting applicants' claimed limitations (*col. 4, line 26*).

Regarding claims 5 - 7, Okamoto discloses magnetic shield and non-magnetic "barrier" layers meeting applicants' claimed structural limitations (*col. 3, line 49 bridging col. 4, line 52*).

9. Claims 1 – 3 and 5 - 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Inoue et al. (U.S. Patent App. No. 2002/0145834 A1).

Regarding claims 1 and 11 - 13, Inoue et al. disclose a magnetic head read (*Title*) comprising a head gap fill layer meeting applicants' claimed composition limitation (*Paragraphs 0020 and 0112*). The limitation "ALD-formed" is deemed not germane to the determination of patentability of the claimed *product* for the reasons discussed above.

Regarding claims 2 - 3, Inoue et al. disclose thickness values meeting applicants' claimed limitations (*Paragraphs 0021 and 0073*).

Regarding claims 5 - 8, Inoue et al. disclose magnetic shield and non-magnetic "barrier" layers meeting applicants' claimed structural limitations (*Paragraphs 0078 and 0112*).

Regarding claims 9 and 10, Inoue et al. disclose sensors meeting applicants' claimed limitations (*Paragraphs 0075 – 0076*).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 4 and 14 – 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. as applied above, and further in view of applicants' admissions.

Inoue et al. is relied upon as described above.

Regarding claims 4 and 14, Inoue et al. fail to disclose controlling the thickness variation to be less than about 2%. The Examiner notes "as-deposited" is a process limitation and is not germane for the determination of patentability in a *product* claim provided that the final product exhibits a thickness variation meeting the claimed limitation (i.e. subsequent polishing, etc. can be used to reduce the thickness variation and still read on the claimed limitation).

However, applicants admit that a thickness variation of less than 2% is a desirable characteristic for a read gap fill layer.

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Inoue et al. to insure that the thickness variation of the disclosed read gap fill layer as admitted by applicants, since such a magnitude is admitted to be desired by one of ordinary skill in the art.

Regarding claims 15 and 16, the Examiner notes that Inoue et al. disclose depositing alternating layers of Al₂O₃ and AlN via sputtering (*Paragraph 0112*) which are

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deemed to necessarily produce (1) Al_2O_3 and AlN phases, (2) separate layers of Al_2O_3 and AlN , and (3) the ternary phase $\text{Al}_x\text{O}_y\text{N}_z$ in at least the interface regions between the Al_2O_3 and AlN layers.

12. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. in view of applicants' admissions as applied above, and further in view of Okamoto ('087 B1).

Inoue et al. and applicants' admissions are relied upon as described above.

While the Examiner maintains that in the interface regions between the Al_2O_3 and AlN layers, the ternary phase $\text{Al}_x\text{O}_y\text{N}_z$ would necessarily exist, the Examiner acknowledges that neither of the above explicitly disclose using such a ternary phase.

However, Okamoto teaches that using a $\text{Al}_x\text{O}_y\text{N}_z$ ternary phase material provides a magnetic gap material possessing excellent heat transferring property (*Abstract*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Inoue et al. in view of applicants' admissions to use at least one layer of the ternary phase material $\text{Al}_x\text{O}_y\text{N}_z$ as taught by Okamoto since such a material provides a magnetic gap material possessing excellent heat transferring property.

13. Claims 3, 4, 8 – 10, 14, 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okamoto as applied above, and further in view of applicants' admissions.

Okamoto is relied upon as described above.

Regarding claims 4 and 14, Okamoto fail to disclose controlling the thickness variation to be less than about 2%. The Examiner notes "as-deposited" is a process limitation and is not germane for the determination of patentability in a *product* claim provided that the final product exhibits a thickness variation meeting the claimed limitation (i.e. subsequent polishing, etc. can be used to reduce the thickness variation and still read on the claimed limitation).

However, applicants admit that a thickness variation of less than 2% is a desirable characteristic for a read gap fill layer.

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Okamoto to insure that the thickness variation of the disclosed read gap fill layer as admitted by applicants, since such a magnitude is admitted to be desired by one of ordinary skill in the art.

Regarding claim 3, applicants admit that reducing the thickness of the read gap fill layer to thickness values within applicants' claimed range can result in improved heat dissipation (*Paragraphs 0005, 0006 and 0013*).

Regarding claims 8 – 10, applicants admit that barrier layers and sensors meeting applicants' claimed limitations are known exemplary materials/structures used in/with magnetic read heads (*Paragraphs 0004 – 0008 and 0013*).

Regarding claims 15 and 17, the Examiner notes that Okamoto discloses sputtering $\text{Al}_x\text{O}_y\text{N}_z$ (*col. 3, lines 59 - 62*) which are deemed to necessarily produce (1) Al_2O_3 and AlN phases and (2) the ternary phase $\text{Al}_x\text{O}_y\text{N}_z$.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Several references disclose substantially identical subject matter as the references relied upon above, however additional 102-type rejections predicated on the following art have not been applied since any amendment/argument to overcome the above rejections is reasonably expected to distinguish over the following references now of record. Specifically, the Examiner notes Yang et al. (U.S. Patent No. 6,452,757 B1), Hong et al. (U.S. Patent No. 6,198,608 B1), Sasaki et al. (U.S. Patent App. No. 2001/0013997 A1) and Inoue et al. (U.S. Patent No. 6,414,825 B1). Finally, the Examiner notes the following references which support the Examiner's Official Notice that sputtering and ALD are known equivalent methods for depositing dielectric material/gap layer material for magnetic read heads: Lee et al. (U.S. Patent No. 5,923,056) (*col. 2, lines 16 - 23*) and Trindade et al. (U.S. Patent App. No. 2002/0057538 A1) (*Paragraph 0043*). The Examiner notes that Yang et al. ('757 B1) clearly teaches that artisans in the magnetic head field would be well versed in the semiconductor art (*col. 3, lines 41 - 54*).

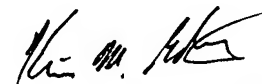
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15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (571) 272-1505. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol Chaney can be reached on (571) 272-1284. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KMB
April 28, 2005


Kevin M. Bernatz, PhD
Primary Examiner